

translation of previous research into better clinical outcomes.

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Cardiac Arrhythmias and Implantable Devices

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Significant original research was reported at the American College of Cardiology 2003 National Meeting in the field of cardiac arrhythmias and implantable devices.

Cardiac resynchronization therapy (CRT) is still a topic of great interest and rapid evolution. The initial results of the Comparison of Medical Therapy, Pacing, and Defibrillation in Chronic Heart Failure (COMPANION) trial were presented. This was the first CRT trial designed to assess mortality. Patients were randomly assigned to optimized medical therapy, biventricular pacing, or biventricular pacing with implantable cardioverter-defibrillator (ICD) capability. The lowest mortality was observed in the group with CRT and ICD ($p = 0.002$). It also was noted that the difference in response between patients with ischemic cardiomyopathy and those with dilated cardiomyopathy was not significant.

A question often asked about CRT is whether paced patients who have an underlying intrinsic rhythm with a narrow QRS interval receive benefit from an upgrade to CRT. Oezatalay et al. (1) presented data demonstrating that these patients not only have symptomatic improvement with CRT but may demonstrate greater improvement than patients with an intrinsic interventricular conduction delay because of the potential deleterious effects of pacing from the right ventricular apex.

A prospective trial demonstrated that patients with chronic atrial fibrillation receive benefits from CRT similar to those of patients in normal sinus rhythm (2). This further supports the available data from the Multisite Stimulation in Cardiomyopathy (MUSTIC)-Atrial Fibrillation trial.

The assessment of interventricular dyssynchrony by pulsed wave tissue Doppler imaging and strain gauge techniques were shown to have potential for better determining patient selection for CRT, for assisting in positioning the coronary venous lead, and for subsequently optimizing the left ventricular to right ventricular timing differences (3-5).

Cardiac resynchronization therapy implant techniques, both epicardial lead placement (6) and coronary venous lead placement, continue to evolve. Worley et al. (7) reported on a group of 35 patients in whom they performed coronary venous angioplasty that subsequently allowed successful lead placement in 70% of the group who might otherwise have required epicardial lead placement.

Information also emerged about inflammatory markers and neurohumoral changes after CRT. Cardiac resynchronization therapy was shown to lower levels of brain natriuretic peptide, atrial natriuretic peptide, and endothelin-1 (8), and Theodorakis et al. (9) demonstrated lower interleukin-6 values with CRT.

Many clinicians are struggling with the implications of the Multicenter Automatic Defibrillator Implantation Trial-II (MADIT-II) and how to apply these data to the large population of patients who meet these criteria. As of mid-2003, there is no ruling from the Centers for Medicare and Medicaid Services, that is, MADIT-II criteria do not represent a reimbursed criterion. Sharma et al. (10) assessed all their patients who would meet MADIT-II criteria and found that if applied nationally, this would lead to additional implants in approximately 460,000 patients. Other investigators found that MADIT-II results can be generalized to tertiary referral centers (11), and others demonstrated that adding bundle-branch block to the MADIT-II

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criteria further defined patients who are at even higher risk for sudden cardiac death (12).

Numerous investigations supported the use of atrial pacing algorithms in permanent pacemakers which will detect and alter pacing rates in the presence of premature atrial contractions (13-15). This is an area in which data are expanding rapidly, with multiple trials assessing the use of atrial pacing algorithms in patients with a history of paroxysmal atrial tachyarrhythmias or who are at risk for the development of atrial tachyarrhythmias.

Several randomized clinical trials have assessed the effect of pacing mode on morbidity and mortality, that is, VVI or VVIR versus physiologic (DDD, DDDR, AAI, AAIR) pacing modes. Initial results from the United Kingdom-Pacing And Cardiovascular Events (UK-PACE) trial were presented. This trial compared DDD with VVI and VVIR modes and included patients who were older than 70 years and had atrioventricular block. In UK-PACE, the primary end point was all-cause mortality, and the combined secondary end point was cardiac death, atrial fibrillation, heart failure, hospitalization, stroke, thromboembolic event, or reoperation.

There was no significant difference in mortality and no significant difference in the incidence of atrial fibrillation. Relatively consistently, previous trials had demonstrated a decrease in atrial fibrillation with physiologic pacing modes, with one exception.

There was no difference in the UK-PACE composite end point between DDD and VVI/VVIR pacing modes.

The mechanisms and management of atrial fibrillation are still of substantial interest. A randomized clinical trial compared oral amiodarone with placebo from two weeks before to eight weeks after cardioversion (16). Amiodarone was shown to have the advantage of chemical cardioversion in a significant number of patients, but pretreatment did not alter the efficacy of cardioversion. The recurrence rate of atrial fibrillation after a first relapse after treatment with metoprolol, sotalol, or amiodarone was also reported (17). The study demonstrated a better outcome with metoprolol, with 40% of patients remaining free of symptomatic recurrence of atrial fibrillation, and better compliance.

Results from the Percutaneous Left Atrial Appendage Transcatheter Occlusion (PLAATO) feasibility trial were presented (18). It included 56 patients and demonstrated that the device for percutaneous left atrial appendage transcatheter occlusion is safe and effective. Whether this confers long-term protection from stroke will be determined by long-term follow-up and by a larger trial.

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